ORGANIC GARDENING

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JULY, 1944

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Editor of ORGANIC GARDENING

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ORGANIC GARDENING — Emmaus, Pennsylvania

Vol. 5, No. 2. July, 1944 $2.00 a year 25c a copy

J. I. Rodale, Editor Sir Albert Howard, C.I.E., M.A., Associate Editor

With The Editor

Lime

LIME is needed in the compost heap in order to maintain the proper condition of alkalinity; so that the soil microbes can perform their function of decomposing matter. The best range is between 7 and 8 pH. It also helps to fix the nitrogen. It aids in the conversion of volatile nitrogen compounds into stable compounds.

Lime is a substance formed from rocks—that is, limestones. All soils originally were formed from rocks and this process is still going on. Calcareous soils are soils formed from limestones and such types of soil are about the best for growing crops. Limestone is one of our most common rocks. If the limestone that is mined today and ground up into a powder, were left to weather, it would eventually turn into soil.

When limestone is ground up it is called ground limestone and in this form it is the best for use on the land or in the compost heap. The finer it is ground the better it is. When 75% of it will pass through a 100 mesh sieve it is extra fine. When only 50% will pass through a 100 mesh sieve the balance through a 10 mesh, it is considered coarse. Ground limestone is calcium carbonate.

When limestone is burned it turns into calcium oxide or quicklime which is much too fierce in its action. It kills microorganisms and would not be a harmonious element in the biologic life of the heap. The assassin of President McKinley was buried in quick-lime for quick destruction. F. B. Billington in his book called "Compost" (Faber and Faber, London) advises the use of quick-lime for heaps made up of vegetable matter exclusively. Quick-lime is also called burned lime or caustic lime.

When water is added to quicklime it becomes calcium hydroxide or hydrated lime. There is a violent chemical action and the material gets very hot. When you get lime-water in a drugstore for feeding to infants it is nothing more than a saturated solution of hydrated lime. Hydrated lime should not be used in the compost heap unless ground limestone is not available. In such event it would be better to use wood ashes.

There has been much confusion as to which form of lime to use in the compost heap. Experimental work shows conclusively that ground-limestone is first, then comes hydrated lime. Quicklime is the worst.

In a letter from Sir Albert Howard he gives his opinion in an amusing manner regarding the best form of lime to use. He says, "The great lime question reminds me of the changing fashions in the ladies' dresses and hats! When I was a student the great thing was ground quick-

Read Magazine, Inc. Executive and Editorial offices, 6th and Minor Sts., Emmaus. Penna. Subscription rates 12 issues for $2.00. ORGANIC GARDENING, published 12 times a year by Read Magazine, Inc., 6th and Minor Sts., Emmaus, Penna. Entered as second class mail at the postoffice at Emmaus, Penna., under the act of March 3, 1879. Printed in U. S. A.

lime (CaO). Farmers always used slaked lime (mostly Ca-(OH)2 and some carbonate). In olden days chalk (CaCo3) used to be common. Now the fashion is to use limestone meal (impure CaCo3). Personally I think the carbonate should be used in composting, as it is not so fierce as the hydrate. What we need are comparative experiments on a farm scale. I hope one or another of the U. S. Experiment Stations will tackle the problem *on a practical scale* and not in test tubes."

The popular use of quick-lime in olden days in agriculture was due to the fact that they did not have the machinery necessary to grind the limestone as fine as we can to-day. Many farmers had limestone kilns on their land where limestone was burned for this purpose. On Pennsylvania farms today many of these can still be seen although they are rarely used. Such is habit, however, that although the need for it is gone, many farmers still swear by quick-lime.

There is a widespread fallacy which has recently been exploded at the N. J. Agricultural Experiment Station in connection with the application of lime to manure. General advice to the farmer has always been not to place lime next to manure. One company which sells a chemical activator to hasten the decay of the compost heap has consistently advertised a warning never to put lime next to manure. Even the U. S. Dept. of Agriculture has held this view. "The Garden Dictionary" edited by Norman Taylor says, "Do not add lime in any form to any manure heap, nor to a compost pile. It does more damage there than anywhere else for it greatly increases the loss of nitrogen."

How could such an incorrect notion arise in the first place? I believe it must have become established when the use of quick-lime was popular. Quick-lime should never be sprinkled on animal manures. The latter contains much ammonia and as a result a strong chemical action occurs. The quick-lime instantaneously robs the water-dissolved ammonia of all its water and ammonia gas, and having nothing to hold it, it goes off into the air. The other two forms of lime, the hydrate and the ground limestone do not react that way. When the use of quick-lime became less popular the old idea "stuck."

Bulletin 707 of the N. J. Agr. Exp. Station (New Brunswick, N. J.) gives the results of the experiments which indicated that not only did the use of hydrated lime with manure save the nitrogen, but it actually fixed a great part of the nitrogen that might otherwise be lost. The same thing happens in the compost heap. The limestone helps to fix nitrogen.

Sir Albert Howard for 40 years successfully used ground limestone in compost heaps in spite of the generally accepted theory that lime must not be used next to manure. The fact that it worked was all that was necessary. Professor Emerson, of Ames College, Iowa who was Chief of the Soil Survey Division of the U. S. Department of Agriculture has stated that limestone used either with plant or animal manure often increases its value as much as 400%.

There is a sludge produced from the carbide of miner's lamps which is a form of lime, but it isn't recommended as it may contain impurities harmful to soil life.

Gypsum is a form of lime that contains sulphur and is definitely not recommended either in the compost heap or direct on the land. It has the opposite effect of lime, as it makes the soil acid, not alkaline. In the olden days it was called land-plaster and used extensively. Benjamin Franklin's classical experiment with gypsum is well-known. He spread it on a lawn in the form of words reading, "This field has been plastered." The grass grew very bright wherever the gypsum was applied. This experiment, of course proved nothing, but the immortal Franklin unwittingly had given the cause of agriculture a shove in the wrong direction. The sulphur in gypsum gives rise to certain sulphur-reducing bacteria which are known to kill off very important and beneficial soil fungi.

On the West Coast over two to three hundred thousand tons of gypsum are used annually because a major portion of such soils have turned to alkali due to climatic conditions and cropping practices such as irrigation. Alkali lands are found also in other warm countries such as India, Persia, Asia, etc. Toxic alkali salts appear on these lands because constant irrigation causes the land to lose its porosity. Questionable farm practices interfere with the surface drainage causing accumulation of stagnant water in the subsoil. The use of strong chemical fertilizers, by burning out organic matter and hardpacking the soil contributes to a condition leading to an alkali formation, although irrigation is the main offender.

Sir Albert Howard in "An Agricultural Testament" says, "The theory of the reclamation of alkali land is very simple. All that is needed, after treating the soil with sufficient gypsum (which transforms the sodium clays into calcium clays), is to wash out the soluble salts, to add organic matter, and then to farm the land properly. Such reclaimed

soils are then exceedingly fertile and remain so." There are methods of reclaiming alkali lands which Sir Albert advocates without resorting to gypsum but they are too technical for inclusion here.

WOOD ASHES

Wood ashes are better than lime in the compost heap because they are more quick-acting. Hardwood ashes are better than soft because they contain more potash. Soft wood trees are pine wood, poplar, maple, ash, etc. Hard wood trees are oak, hickory, dogwood, beech, etc. For the same reason many persons prefer hard wood leaf mould in their gardening.

At one time wood ashes was the chief source of potassium and was extensively used in farming. Those were the days before the modern conveniences found their way onto the farm. Unleached hardwood ashes contain about six per cent of potash, about two per cent of phosphoric acid and 30 per cent of lime. If left out in the rain and leached, the potash content may go down to as low as one or two per cent. Wood ashes contain small amounts of magnesium and other elements, but no nitrogen.

If too much of this substance is applied to the soil, especially an alkaline soil, the plants may have pale, under-nourished-looking tops. If they are put on too thick the soil may become hard and lumpy.

Paper ashes should not be used as they contain strong acids and other harsh substances used in the manufacture of paper which are not good for growing crops.

Lime as a General Fertilizer

The benefits to be derived from liming of soils were known to the ancient Egyptians. Lime is not a strong chemical and therefore may be used on the land with safety. Most lime is organic in origin. Limestone beds are mostly ancient sedimentary marine deposits, made up of fossilized shells, corals, and skeletons of marine animals.

Although ground-limestone is used in the compost heap it may also be used on the land direct. It may even be used where a test already shows an alkaline condition, because limestone is a fertilizer material and may contain some magnesium, nitrates, phosphates, potash, calcium and other rare elements. There are many limestone soils, whose parents were limestone and which contain an underlying limestone formation, yet are starved for lime or calcium due to unwise farming practices. Such soils need limestone.

The use of ground limestone increases the number of bacteria in a soil unless it is limed too much. Quicklime kills bacteria. Ground limestone seems to improve the soil structure also and its application increases crop yields. In an experiment at the Georgia Agr. Exp. Station where 400 pounds of limestone per acre was added to the chemical fertilizers the pea and vetch crop increased from 506 pounds per acre to 4,092 pounds. Increase is not accomplished at the cost of quality. O. B. Price in the Michigan Agr. Exp. Station Quarterly Bulletin for 1923 described a 500% increase in calcium and a 300% increase in the phosphorous content of alfalfa where two tons of ground limestone had been applied to the acre.

Ground limestone may be applied almost anytime. One method is to apply the lime every time corn is planted in the rotation. Lime seems to give marvelous results with all legumes, such as the clovers, alfalfa, etc. On sod fields it may be spread even in the winter. Do not use lime for white or sweet potatoes and blueberries.

From Missouri, we have the statement of Dr. William A. Albrecht, Chairman, Department of Soils, Missouri College of Agriculture, that from his own personal observations he found that cattle—left to their own devices, would turn down good appearing food in nearby acres and would travel a long distance to eat the crops on plots that were most abundant in minerals—particularly lime.

The parentage of a soil is of extreme importance in determining the health-giving qualities of food raised in it. Experimental work every day seems to point to this fact and it will soon be fashionable to boast of one's soil's genealogical origin. Where soil is known to have formed from limestone it has excellent possibilities. Other good rocks that have crumbled and disintegrated to form soil are basalt, dolerite, diorite and gabbro formations which have plenty of lime in their make-up. Bad geologic formations are sandstones, aplites and granites which produce silicious sandy soils, low in lime. In such cases liming of the soil would appear to be quite necessary and regular routine.

An important study issued by the U. S. Dept. of Agriculture in March 1941 (Misc. Publication No. 369) gives many interesting cases of diseases in cattle fed on lands which have rock origins such as granite, volcanic, sandstone, etc. In the same regions on limestone soils the cattle are much more healthy. The title of this bulletin is, "The mineral composition of crops with particular reference to the soils in which they were grown." This is

a very important field of research and it is especially so because of the need of working out a safe powdered rock mixture in place of strong chemical fertilizers for use on the land along with humus.

In England a great deal of chalk is used. This is built up of finely divided fossilized shell particles. It has twice the bulk of lime but only half its value. It is a poor substitute for lime. Marble is metamorphosed (changed) limestone, usually very pure, and crystallized by pressure and heat. In some parts of the country marble dust is sold for use instead of lime. So long as it is merely pulverized and not hydrated it would be satisfactory, its chemical formula being the same as limestone, namely, calcium carbonate. Marl, is usually lime which has been washed out of the soil by rain water, forming "hard" water, and redeposited in beds. It also is calcium carbonate.

Dolomite is a form of lime which is rich in magnesium. A dolomite from a nearby quarry owned by the Bethlehem Steel Co., averages 54% calcium carbonate and 43% magnesium carbonate. In their advertising matter they state, "This combination of plant foods is more effectual in neutralizing soil acids than the purest commercial calcium carbonate obtainable (lime)". In bringing this claim to the attention of Dr. Ehrenfried Pfeiffer, author of "Bio-Dynamic Farming and Gardening", he said, "This form of agricultural lime known as *dolomite* is considered to be better balanced than limestone alone. It is gradually absorbed by the soil and is less likely to be washed away than ordinary lime."

Limestone may be applied at the rate of from 500 pounds to three or four tons to the acre. For small gardens about 50 pounds to 1,000 square feet should be sufficient. If hydrated lime is used the amount should be reduced by about 30%. For garden use place the lime in a burlap bag and shake it over the surface. It can then be worked into the soil. It can be applied in the fall, winter or spring.

J. I. RODALE.

Making Compost

Medicinal Gardening

BY DR. CHARLES W. BALLARD
Dean, College of Pharmacy, Columbia University

A broadcast from Schenectady, N. Y., over WGY on May 3, 1944

THE victory garden movement has not only been a factor in supplementing wartime shortages in foodstuffs but, equally important, it has created a greater interest in plants among thousands of our people. With small vegetable gardens an established fact, what about medicinal gardening? Is there not a shortage of drug plant products, especially those formerly imported? Can we relieve this shortage by growing drug plants in addition to tomatoes and string beans?

Answering these questions in turn. Certain drug plants have been cultivated in this country for many years but comparatively few yield sufficient financial return to justify the effort. There are shortages in imported drug plants. Because of the great diversity in climatic and soil requirements of many important drug plants, we cannot grow them in this country.

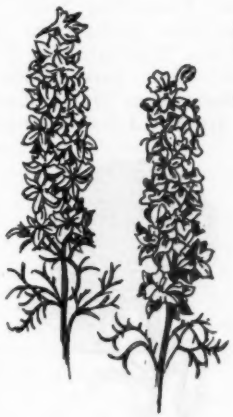
There is an appeal in drug gardening which probably traces back to the ancient mysticism surrounding both the growing and the use of plant drugs. Also it is far less commonplace than raising cabbages and potatoes. But before we go too far in planning our drug garden, let us give a little thought to such things as the quantities needed for preparing medicines, the existing sources of supply and the time required to produce the drug product.

The quantity of plant drugs required is really very small as compared with the amount of food produce needed. We eat more than our weight in foodstuffs each year but our medicine requirements probably do not exceed more than a few ounces per year. Certain heart disorders require an almost constant administration of Digitalis but an average Digitalis leaf will supply the needs of the patient for nearly a month.

As to existing sources of supply. Many of our vegetable drugs are readily obtainable from wild growing plants and it is only necessary to collect and dry them. There are shortages in supplies of these native drugs but the condition is due to the general labor shortage rather than lack of plants from which they might be collected.

St. Brigid
Anemone

How soon will our garden yield drug produce. While many drug plants are annuals, others require several years cultivation before yields can be expected. This is especially so if the root and bark portions are used for medicinal purposes. Golden Seal



Larkspur
(Annual)

is a typical example. It is an expensive drug but profitable yields cannot be expected in less than three or four years. Incidently it is in commercial cultivation.

How does our store of knowledge about growing drug plants compare with that in regard to food plants? Food crops have been cultivated for centuries and our present procedures are based on this long experience. In many instances our knowledge of drug plant culture is so incomplete that considerable experimentation is necessary. Also there may be difficulties in obtaining the seeds of these plants for they are not usually stocked by supply

houses. Obviously drug farming is subject to the usual risks of weather, disease and insect pests and a product lacking in the desired physical characteristics or deficient in medicinal constituents will bring poor returns.

The climatic and soil requirements of drug plants have already been mentioned but we never fully realize that drugs come from almost every corner of the earth until supplies from the customary sources are interrupted. Licorice from Mediterranean Countries, Senna from India, Gum Arabic from Africa, medicinal Rhubarb from China, Opium from Asia Minor and Cinchona from Dutch East Indies are but a few examples of

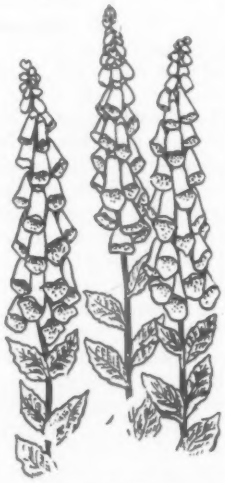
African Marigold

the widespread distribution of cultivated drug plants. In addition we have many more in each region which are collected from wild growing plants. The possibilities of developing varieties which will thrive in this country are remote. However, in many instances we have made considerable progress toward self-sufficiency through the production of replacements or substitutes. The production of Camphor from the camphor wood was a Japanese monopoly and the supply of Cinchona Bark which yields Quinine was controlled by the Netherlands. Synthetic Camphor is now produced on a commercial scale and the synthesis of Quinine by American chemists have recently been reported.

Despite the difficulties in growing medicinal plants, we have recently achieved self-sufficiency in the supplies of two important drugs—Belladonna and Digitalis. The history of the Belladonna project is typical of what may be expected in large scale drug farming although the successful result attained in this instance cannot be expected in all. After two years of painstaking work involving raising a first crop to supplement the scant supply of seed, the handling of five million seedlings in greenhouses, operation in six states, crop losses through mildew and insect attack and a total expenditure of near $100,000 a high test belladonna for medicinal purposes has been produced.

The commercial production of Digitalis was much simpler for this plant known to flower growers as Foxglove, has been cultivated as a garden flower for many years. But even here there was some difficulty in procuring proper seed. At least eleven pecies of Foxglove are cultivated by flower growers but only one of these, Digitalis purpurea, is recognised as the official medicinal product.

I have often wondered why more of the small gardens did not include some of the plants useful for flavoring purposes, especially as some of these so-called herbs may be used as home remedies. Fennel, Anise, Caraway and Dill contain aromatic oils frequently used in relieving what is commonly termed indigestion. Sage and Thyme are used in poultry and sausage seasonings. Peppermint and Spearmint do double duty as flavoring agents and home medicines. The plants used to prepare the old fashioned teas or hot drinks for colds and other ailments can be grown for home use although they may be plentiful in the wild growing state.



Fox Glove

Typical examples are boneset, catnip, chamomile, horehound and tansy. In all instances very small plantings will give ample supplies for immediate use and a surplus for drying. A further caution is in order in regard to the cultivation of these wild growing plants in any garden. Do not allow the seeds to escape as, for the most part, these plants are both hardy and persistent. They can easily become just as much of a nuisance as weeds.

There is another form of medicinal gardening which has claimed medical and popular attention during the past year—the cultivation of the fungus or mold known to botanists as Penicillium notatum for the production of Penicillin. Of course this form of gardening is somewhat different in that we sow spores on special culture materials in-

stead of planting seeds in the soil; in that extreme care must be taken to avoid contamination by other molds and bacteria; and that our plants do not have roots, leaves, flowers and fruits. Nevertheless this mold is a plant and several millions of dollars have been expended in this type of medicinal gardening to the end that we may have another plant product which will combat disease and save lives.

Finally, many gardeners do not realize that they are raising medicinal plants in their flower gardens if these include Monkshood, Foxglove, Larkspur, Pyrethru, Marigold and Anemone for these plants furnish drug products. And as for the vegetable gardener, the lettuce and carrots he produces contain vitamins which are of medicinal value.

Apple Pomace

In looking around for something to fertilize a lot that we own, which was very non-productive, and upon which I wanted to grow vegetables and flowers I happened to think that apple pomace would help. They were organic, they contained minerals and vitamins and the least that could be said they would furnish humus for the soil. I went to the cider mill, not far from here, and asked the man who owns it if he might have some. Of course he told me to take all I wanted. He also told me that one of the professors in the agriculture department at Notre Dame University told him that they contained more phosphorous than any other kind of fertilizer. So I got some, about three cubic yards, and as I spaded this piece of ground I filled the furrow with these pomace and spade them under. This was in March of 1942. That spring I had an opportunity to talk to one of the professors of the agriculture department of Purdue University. I asked him about apple pomace. He said they were good fertilizer. That I would not get the full benefits of them this year because they were slow in decaying. That the great benefit in them was in the seeds. But I did get results the first year and very good results the second year.

In talking with the man who owns the cider mill he began to think probably there was some good in them. He owns a large orchard. He now takes his pomace and puts them under his trees. He tells me that the trees where he puts these pomace made a marked growth over the other trees and that they bear more abundantly.

Another man who owns a cider mill about twelve miles from here, but who also has a stall on our city market did not know what to do with his pomace. So he put them in a sandy ravine that would not raise weeds. The next year they were higher than his head. Now he puts them on his berries, such as blackberries and raspberries, which need an acid soil. The results are good.

I have never tried to compost them. The next spring after I dug them in they were completerotted. I did not notice any bad effect on the garden from them being in the soil unrotted. In fact there was one strip of red excavation sand that would not raise anything but radishes and after the pomace was placed in it we had a good crop of tomatoes. Last year and this year I have had enough compost and stable manure so I did not try the pomace again.

Very truly yours,
Dr. Roy Rhinehart,
South Bend, Indiana.

We obtained some apple pomace a few years ago but they were very stubborn and resisted decay in the compost heap. Perhaps they may have been strongly sprayed. That is what must be guarded against in getting apple pomace from cider mills.

×

WOOD ASHES

Does it spoil ashes for the compost heap if it is rained upon. Shall I protect it?

Mrs. Isolina Hafford,
Montrose, Alabama.

Answer

Coal ashes should not be used in the compost heap. If you are referring to wood ashes, then it certainly does spoil it to a great extent to leave it out in the rain. It will use up more than half of the potash—wood ashes should always be protected.

Sunflower Seed Registry

Will all those who are growing sunflower seeds for sale advise us of the number of acres they have in this crop and the history of the fertilizer practices followed. Any readers who desire to purchase seed grown organically should advise us at once. We will try and arrange such purchases. Sunflower seeds are a miracle-food and should be eaten by every one.

Humus Manufacture in the Orient

A series of articles by the famous leader of The School of Living, Suffern, N. Y.

BY RALPH BORSODI

Part 3

THE agricultural methods of the Orient, practiced successfully for thousands of years in contrast to the destructive method we have been practising, maintain the fertility of the land in spite of the fact that it is enormously more intensively cultivated than is our own.

Sometime prior to 1910 Dr. F. H. King, formerly Chief of the Division of Soil Management of the U. S. Department of Agriculture, made a trip to China, Korea and Japan for the purpose of studying Oriental methods of farming and on his return published his classic work dealing with this subject which he entitled "Farmers of Forty Centuries." (1). Over and over again, King expresses his astonishment "at the magnitude of the returns these people were getting from their fields." In all these countries he found that the essential basis of their agriculture was the manufacture of humus. Farming in these countries is altogether organic except in a few regions where chemicals have been introduced because of the prestige of American and European "science." King visited a farmer in the province of Shantung, China, "having twelve in his family, who kept one donkey, one cow, both exclusively laboring animals, and two pigs on two and one-half acres of cultivated land where he grew wheat, millet, sweet potatoes and beans." Another farmer with ten in his family, kept one donkey and one pig on one and two-thirds acres of tillable land. He, too, raised wheat, barley, millet, soybeans, and sweet potatoes.

These conditions are representative. They explain the density of the population maintained in this and many other provinces of China and nearly all of Japan. Only by utilizing all wastes—human and animal as well as plant—and by sound systems of rotation and irrigation have these people been able to maintain in many areas, a good standard of living. In the well cultivated areas of these countries, erosion is practically unknown; damage to crops from drought is negligible. The land maintains a continual productivity without the addition of inorganic and artificial fertilizers. Forestry, however, has in some regions been so neglected in favor of farming, that mountains have been denuded and flooding greatly aggravated.

According to King, through our system of sewage disposal:

. . . . the people of the United States and Europe are pouring into the sea, lakes and rivers, and into the underground waters, from 5,794,300, to 12,000,000 pounds of nitrogen, 1,881,900 to 4,151,000 pounds of potassium, and 777,900 to 3,057,600 pounds of phosphorous per million of adult population annually, and this waste we esteem one of the greatest achievements of our civilization. . . . . The Mongolian races with a population now approaching 500 million; occupying an area little more than one-half that of the United States, tilling less than 800,000 square miles of land, and much of this during twenty, thirty, or perhaps forty centuries; unable to avail themselves of mineral fertilizers, could not tolerate such waste and survive.

All village wastes are regularly collected and carefully preserved to be used in compost heaps made in layers of manure, street and household refuse, stubble, plant waste, and soil brought in from the fields. The method

(1) This section is almost entirely based upon "Farmers of Forty Centuries," by F. H. King, formerly Professor of Agricultural Physics in the University of Wisconsin, and Chief of the Division of Soil Management, U. S. Department of Agriculture.

scientifically developed in the Indore Process has been practiced in various ways from time immemorial.

In this country, as in all the great industrial civilizations, the human population is for the most part concentrated in great cities. Yet the entire population is kept alive only upon the fertility extracted from the land. But none of the fertility shipped into cities is returned to the land. In practically all cases, not only the sewage but also the garbage, are treated as nuisances to be gotten rid of as quickly as possible sometimes by using them as filling, sometimes by dumping them into the ocean, sometimes by washing them through sewers into rivers, and sometimes by incineration. None of it is properly decomposed and returned to the land. "From the point of view of farming," says Howard (x), "the towns have become parasites. They will last under the present system only as long as the earth's fertility lasts. Then the whole fabric of our civilization must collapse." This is, of course, an understatement of the situation. So far as the great nations of the West are concerned the collapse need not wait upon the exhaustion of the earth's fertility as a whole, but only upon the exhaustion of those distant, virgin areas which are shipping their fertility into the great cities. The moment these become exhausted, the cities will find it economically impossible to sustain themselves.

In Japan, where good yields of rice are about 80 bushels to the acre and crops of barley may exceed this, manure compost, night soil, and rape seed or soybean cake, are largely depended upon for fertilizers. In 1908 Japan applied to the fields 23,850,295 tons of human manure and 22,812,787 tons of compost, 1,404,000 tons of fuel ashes, and 10,185,500 tons of green manure products. A total of 58,252,582 tons of native manure supplied to 15,201,969 acres of land amounts to over 3.8 tons per acre. Much of this land, as in China and Korea, is irrigated by canals and rivers which supply additional fertilizer nutrients in the form of matter in solution.

No other evidence is needed to establish the efficiency of organic farming and humus manufacture than that furnished by King in this monumental study. But it is obvious that if American farmers were taught to farm upon this principle, and agricultural scientists spent a fraction of the time experimenting with humus manufacture that they now devote to experimenting with commercial fertilizers, the quality and yields of agricultural products would greatly increase.

Humus versus Chemicals

Waksman summarized the specific effects of humus upon the soil as follows:

1. It serves as a storehouse of plant nutrients; the gradual decomposition of the organic matter by micro-organisms results in the liberation of a continuous stream of carbon dioxide, of available nitrogen as ammonia which is soon changed to nitrate, of phosphorous, and of other elements essential to plant growth.

2. It has important physical effects upon the soil, it improves the soil structure; it provides better aeration; it has a binding effect upon the soil particles; it increases the water-holding capacity of the soil; it helps the soil to absorb more heat; it increases the buffering properties of the soil, preventing rapid changes in acidity and alkalinity.

3. It has certain chemical effects upon soil constituents, rendering various elements, such as phosphorous, more soluble, and neutralizing substances which tend to be toxic to plants; it has a very high base-holding power, and it enhances utilization of mineral fertilizers by plants.

4. It has a mechanical effect upon the soil, providing a more favorable medium for the development of the root systems of plants and for the growth of micro-organisms essential for soil processes.

5. By favoring the growth of the common saprophytic soil bacteria, fungi, protozoa, and nematodes, it has an antagonistic effect upon micro-organisms injurious to plants. (2).

The known benefits of humus in the soil are, therefore, numerous and its presence is now recognized as indispensable to the maintenance of soil fertility and healthy plant growth, in spite of the fact that just how humus functions in plant growth —just what its relationship to the inorganic soil particles and to the plant roots may be—is controversial and is still being investigated. Howard believes that a mycorrhizal relationship exists between all plants and the soil, and by this connection certain soil fungi living on humus "are able to invade the living cells of the young roots and establish an intimate relation with the plant." (3). He says that microscopic examination reveals that the root finally consumes the fungus and thus the plant obtains the carbohydrates and proteins previously obtained by the fungus from the humus in the soil. He explains the importance of this relationship as follows:

The mycorrhizal association

(x) "An Agricultural Testament," p. 104.

therefore is the living bridge by which a fertile soil (one rich in humus) and the crop are directly connected and by which food materials ready for immediate use can be transferred from soil to plant. How this association influences the work of the green leaf is one of the most interesting problems science has now to investigate. Is the effective synthesis of carbohydrates and proteins in the green leaf dependent on the digestion products of these soil fungi? It is more than probable that this must prove to be the case. Are these digestion products at the roots of disease resistance and quality? It would appear so. If this is the case it would follow that on the efficiency of this mycorrhizal association the health and well being of mankind must depend.

That proper aeration and moisture can only be maintained in soil well supplied with humus has definitely been established. The cumulative extraction of humus from the soil and the failure to replace it because of faith in chemical fertilizers, must therefore make more and more plowing and harrowing necessary. Waksman explains that humus tends to make the soil granular and causes the individual particles to form aggregates that prevent "baking when the soil is dry and stickiness when it is wet" and thus gives to "the soil the properties of heavier texture with higher moisture-holding capacity."

There is substantial evidence that chemical fertilizers hasten final decomposition of the humus in the soil. Instead of the use of chemicals acting as substitute for an insufficiency of manure, the more chemicals are used, the less values does the farmer get from the manure he is able to spread. The chemicals discourage the operation of the micro-organisms and the earthworms in normal soil. They must therefore interfere with the process, emphasized by Howard, by which the plant nutrients in humus are transformed into forms than can be assimilated by the plants. Furthermore, any reduction in the proper proportion of these micro-organisms and other forms of life in the soil, must tend to produce a diseased soil. That a healthy soil is dependent upon these living organisms has been established by ample evidence. In a paper (4) discussing soil micro-organisms, Waksman says that the soil contains a number of different types of micro-organisms antagonistic to the pathogenic bacteria which cause diseases in plants and animals. For a long time it has been recognized that the soil was capable of absorbing and to some extent destroying disease-producing microbes. The experiments of Waksman and other scientists have now determined that certain types of micro-organisms are responsible for the destruction of harmful bacteria. A healthy soil, one supplied with an abundance of these protective organisms, is our best guarantee against the transmission of disease. Plants and animals raised on farms fertilized organically show an unusual hardiness and a definite resistance to disease. On dairy farms using the Bio-dynamic method, contagious abortion has been eliminated as has been calf paralysis and pneumonia. (5). Diseased animals from other farms have been brought into contact with such herds without infecting them. Howard reports, in connection with other instances, his experience with oxen fed on farms using the Indore Process for all the feed and pasturage for them. Diseases like rindepest, septicaemia, and foot-and-mouth disease, even when they devastated the country side, did not effect them. The animals were not seggregated nor inoculated and frequently came in contact with diseased stock. Yet even when they were observed rubbing noses with foot-and-mouth cases, no infection occurred. (6).

At Marden Park in Surrey, Sir Bernard Greenwell has found that a change over to a ration of fresh home-grown food (raised on soil manured with humus) fed to poultry and pigs has been followed by three important results: (1) infant mortality has to all intents and purposes disappeared; (2) the general health and well-being of the livestock has markedly improved; (3) a reduction of about ten per cent in the ration has been obtained because such home-grown produce possesses an extra-satisfying power. (7).

Howard concludes from his study of this subject that insects and fungi are not the real causes of plant diseases but only attack unsuitable varieties or crops grown in unhealthy soils, and that the policy of protecting crops which are in reality al-

(2) "Humus, Origin, Chemical Composition and Importance in Nature," p. 407.

(3) "An Agricultural Testament," p. 24.

(4) "The Journal of Bacteriology," October 1940.

(5) "Bio-Dynamic Farming and Gardening," p. 194-197.

(6) "An Agricultural Testament," p. 162.

(7) Ibid., p. 179.

ready sick by means of sprays and dusts, is a scientific mistake. The result of feeding such sick plants and foods to the livestock is in turn to lower the natural resistance of the livestock to diseases, and to make them vulnerable in turn.

That the feeding of healthy crops and meats, produced on soil that is healthy, would have an effect on human beings would be expected. Howard cites a number of instances in which the effect of changing from food grown on chemically fertilized land to food grown on humus fertilized land, was demonstrable.

At a large preparatory school near London, at which both boarders and day-boys are educated, the change over from vegetables, grown with artificial manures, to produce grown on the same land with Indore compost, has been accompanied by results of considerable interest to parents and to the medical profession. Formerly, in the days when artificials were used, cases of colds, measles, and scarlet fever used to run through the school. Now they tend to be confined to the single case imported from the outside. Further, the taste and quality of the vegetables have definitely improved since they were raised with humus. (8).

"The New York Times" also reports an interesting case. Dr. G. B. Chapman of the Physical and Mental Welfare Society of New Zealand reported that sixty boys at the Mount Albert Grammar School, like those in other Schools of New Zealand, suffered from colds, catarrh, infected tonsils, influenza, dental decay and other ailments. Dr. Chapman advised that a change should be made from vegetables and fruits grown in soil fertilized by chemicals, to produce raised on soil treated only with humus. The result was startling. Catarrh, colds and influenza were greatly reduced and in the 1938 epidemic of measles, the boys had only mild attacks whereas new admissions succumbed readily. (9).

(8) Ibid., p. 179.
(9) "Science Section" of "The New York Times," June 30, 1940.

Photograph Contest

We wish to announce a contest, open to subscribers of ORGANIC GARDENING.

First Prize	$15.00
Second Prize	10.00
Third Prize	5.00
Five Prizes, each	2.00

Send in a photograph of some phase of organic gardening—either a compost heap, a special compost box or pit, trenching pits, in fact, anything that could be shown by means of a photograph that contains some idea of value to either an organic farmer or gardener; with a brief description, if necessary, of the photograph.

These should be ordinary snapshots that are of clear focus, so that they may be reproduced in our magazine.

We retain the right of printing photographs regardless of whether prizes are obtained or not.

Photographs will be eligible if mailed not later than September 1st, 1944. This contest is for the United States and Canada.

Kitchen Wastes Disposal

BY J. I. RODALE

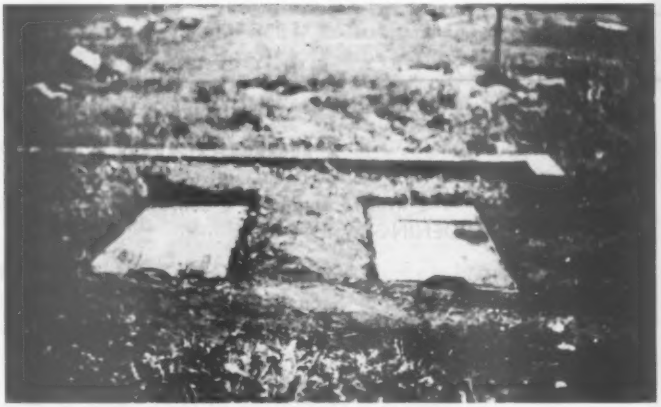
HERE are two methods for the disposition of kitchen wastes which should help alleviate this vexing problem. The most efficient method would be to include these wastes in your regular compost heaps but since you are not making these all the time there must be available at all times a place for the handling of this garbage.

For the very small place I would recommend a fairly good-size wooden barrel. Some time ago a physician from the West Coast wrote in advising that metal cans should not be used because as the material decays it enters into a chemical action with the metal which he claimed has some effect on the decomposed material. There is a question whether this would be serious or not.

Instead of having a regular cover on such a barrel I would get a round tight fitting frame covered with burlap that would be a rather tight fit on top of the barrel. This would permit air to get in and keep flies away. It would permit some rainwater to get in which is excellent. If there is too much rain a wooden cover should be applied.

The method is simple. Each time you place garbage in the barrel you cover it thoroughly, although thinly with ground limestone or wood ashes. Then apply a very light sprinkling of good soil, ever so slight, and finally a covering of some finished compost that you have accumulated, just enough to cover it. If you have no finished compost, you may use purchased peat humus. Extra rotted manure would also be good for this purpose. The compost or humus acts as an absorbent and furnishes bacteria, fungi, etc., to help break down the wastes. There will be no odors.

I can visualize some of our readers who are craftsmen designing a barrel with a removable cover both top and bottom so that after the barrel becomes 2-3 full it can be turned over in a jiffy and then turned again later while the material is composting. We would be glad to receive any photographs of such contraptions from readers for publication.



For the larger place in the country two pits as shown in the picture may be built. One is for garbage. The other is for finished compost or rotted manure, etc. Place the garbage each time in the first pit and cover it with ground limestone, soil and compost as described above. Both pits are covered with a loose frame covered with half inch square wire and burlapping. This frame has a handle at one end and fits loosely in the pit. As the heap rises or lowers in the pits the frames go up or down, as they are absolutely flat.

The pits could be about three feet by six and about two or three feet deep. The second pit is for the compost and as it is used up more is supplied. Additional raw manure may be placed in the bottom of this pit from time to time, by moving the finished compost in the pit to one side. The burlap frames effectively keep all animals away and prevent dashing rains from disarranging the garbage. There are no odors or flies and the method really works.

All family kitchen waste may be used including meat and fish cuttings, watermelon, orange and grapefruit rinds, egg-shells, etc. When the first pit is completely filled it should be turned over getting at the bottom, the recent additions from the top. About a month later it should be turned again. A third pit will then have to be started for garbage.

These pits will not work in the winter. In cold weather special cover arrangements would have to be designed to prevent penetration of cold. It would seem that the barrel method may be practical for winter use but no decay would take place until spring.

Hints For The Victory Gardener

This is the twentieth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

BY ROGER W. SMITH

LETTUCE

FEW salad vegetables exceed lettuce in popularity, and you should have little difficulty in growing it. But success in producing a steady supply of fresh, crisp leaves depends to a great extent upon an understanding of the habits of this plant.

Lettuce (Lactuca sativa) grows readily probably because all cultivated strains were obtained originally from the prickly lettuce (Lactuca scariola) an Asiatic weed. Prominent among other wild forms are Sleep-wort (L. virosa) and the familiar wild lettuce (L. Canadensis) a tall, yellow-flowered herb which is often a troublesome weed.

Almost any fairly good garden soil that is well drained, not excessively acid, is suitable for lettuce. The only real secret about growing fine plants is to keep them uncrowded and growing rapidly. Rapid growth demands an abundance of moisture plus an abundance of natural plant nutrients. Mature compost humus or old, well-rotted manure should be dug in along the row before the seed is sown. In transplanting, a generous amount of organic humus should be worked into the hole before the plant is set out.

Wild lettuce prefers a temperate climate and its cultivated descendants naturally thrive best during cool weather although some loose-leafed strains are notable for their ability to grow during summer heat.

Cultivated lettuce may be conveniently divided into four types.

1. Loose-leaf, non-heading. Probably the easiest of all to grow. Leaves may be harvested by stripping, much as Swiss Chard is gathered, while the plant continues to grow. Grand Rapids, a crumpled-leaf variety which matures in around 45 days, is an excellent example. It withstands summer heat and its green leaves are believed to have a higher food value than any of the blanched types.

2. The Butterheads. These form a soft, buttery head, yellow almost to the center with dark outer leaves. Mignonette, which matures in 80 days is a favorite, Big Boston is another.

3. The Cabbageheads. These offer quite a challenge. If you can produce a good stand of fine heads your reputation as a gardener is secure. Not that this is so difficult if you know how but certain elements have to be kept in mind. New York (Wonderful) and Imperial, 84 days to maturity, are typical. But before going into more detail regarding the cabbageheads you will like to remember that fine strain, the Cos lettuce.

4. Cos (or Romaine). These form a tall, elongated head and have a leaf shaped somewhat like the bowl of a spoon. They have an elegance and fineness of flavor that brings them distinction. Paris White, 83 days to maturity, is matched with Trianon for honors. The outer leaves are sometimes gathered up and loosely tied so that the interior of the head will be surely blanched although the plant usually does a good job of self-blanching. In spite of their refinement, the Cos strains are excellent for summer use.

Whether you grow a row of the loose-leaf type or a few Cos, you will naturally like to grow many large heads of the fine varieties you see in the stores, usually one of the Cabbageheads. In general this form will not head during hot weather. That means that the transplants have to be set out very early, even before danger of frost is past. Delicate as the lettuce plant may seem it is really hardy.

Heading lettuce may be planted to head-up either during the

early summer or the fall. For the early crop the seed should be sown about one-quarter inch deep in flats or similar containers and placed in a sunny window or a cold frame about the beginning of March. The young plants should be ready to set out early in April. In the flats, the seed should be thinly sown and the seedlings thinned just as soon as the leaves touch. Probably no fault is more universal than the common practice of sowing lettuce seed, which is fine but almost always of good quality, too thickly.

Setting the transplants out very early is essential. In fact, some gardeners make a practice of sowing their lettuce seed in the fall in a carefully prepared area. The seedlings become fairly large before severe frost. As cold weather approaches the seedlings are covered with a gradually increasing layer of loose straw, leaves, twigs, and the like. Under this, the small plants survive the winter easily and the gardener has a heavy supply of sturdy, very early seedlings upon which to draw.

In setting out the transplants, they should stand about 15 inches apart in the row and the rows should be about two feet apart. When seed is sown directly into the garden, the seedlings should be ruthlessly thinned to stand at least a foot apart to prevent overcrowding.

In the early stages of its growth the plant has a cluster of shallow feeding rootlets. This condition makes it ideal for transplanting but renders it while small an easy prey of weeds. A light mulching of compost humus sifted around the plants will do much to keep down weedy growth and later supply easily available plant nutrients.

Lettuce plants will not do their best unless they have a very liberal supply of moisture. Normally the supply of rainwater is insufficient, often inopportune. It will aid your plants to continue rapid growth during dry weather if you water them liberally with compost water—rainwater which has filtered through a container holding a quantity of fertile compost humus.

It may be that for one of many reasons your plants do not reach the heading stage before the arrival of hot weather. Many gardeners have had this experience. The most popular solution to the problem consists in covering the plants so as to give them partial shade. A few stakes driven into the ground along the sides of the rows may be used to support a length of cheesecloth stretched upon them. A slightly heavier framework may be made to support a thin layer of brush, or a slat roof in which the slats are alternated with spaces about equal to the width of the slats. Any such arrangement which excludes excessive sunlight will usually produce the coolness necessary to the plants if they are to form satisfactory heads. Some gardeners make good use of a partially shaded spot in the garden as a favored site for lettuce.

Lettuce usually suffers little from insect pests but because of the necessity for growing large, crisp leaves on a plant which in its wild state develops rather small leaves, the gardener must supply rather moist conditions. Because of this, the lower leaves —especially if the plants are overcrowded at maturity—are somewhat subject to attack from a form of rot. If this is not checked it will destroy the heart of the plant. A layer of clean sand spread around the plants will prevent the lower leaves from coming into contact with the soil and do much to prevent lettuce rot.

You may have found in your garden some lettuce plant which seemed to you to have exceptional qualities. Its flavor may be quite different—the degree of bitterness natural to this plant is a very elusive quality. The plant may be allowed to run to seed and if you save the seed your chances are very good that the following season you may be able to grow many similar plants. When you reflect upon the forgotten centuries during which ancient gardeners developed from the weed, Prickly lettuce, the fine salad plant you grow in your garden, you will likely be led to wonder what might have happened had these men selected Lactuca Canadensis, the tall yellow-flowered, variety instead. What now, would have been the form and flavor of the cultivated plant?

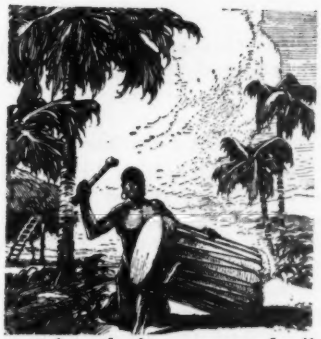
But you will enjoy growing lettuce and you may be sure that what you grow will far exceed in flavor and food value the wilted heads you had formerly purchased in the stores. You will find that different strains of lettuce taste differently. And you will enjoy most of all that moment when, for the first time, you cut and take into the house a couple of fine, firm heads of crisp, fresh lettuce; when, for the first time, you discover the fine flavor that was their inheritance from the compost humus incorporated soil in which they thrived.

An Indictment of South African Farming Methods

Degeneration in Both People and Livestock Through Neglect of the Soil.

ANIMAL HUSBANDRY EXPERTS SUGGEST REMEDIES.

From The Farmer's Weekly (Bloemfontein)—Nov. 17, 1943.



PEOPLE who have made a study of malnutrition in South Africa have more than once asked whether the country is producing sufficient food of good quality. Flowing from this question are others. Is the Union producing sufficient nourishing food for the needs of the population? Are our farms capable of increasing their output of such food?

Two well-known personalities in the sphere of animal husbandry, who during the past twenty or twenty-five years have travelled to most parts of the Union visiting farms, have come to the conclusion that there is something radically wrong with farming in South Africa. In discussion with a representative of *The Farmer's Weekly* they said that, generally speaking, but with certain exceptions, there had been a steady degeneration in the country's livestock. Mentioning cattle specifically, they said that this degeneration was not confined to one or two aspects, but to all—bodily form, size, production ability (milk and meat) and reproduction.

Children

This degeneration, they continued, was not confined to cattle. It was evident in various types of livestock and, what was more tragic, in the children of South Africa. "In several towns and villages," they said, "we have been shocked to notice that in the main there is something wrong with the children. They are not full of the robustness of childhood, their complexions are pale or pasty, their bodies are not well covered and they often seem listless. When we mentioned the matter to a school teacher in a certain area, he said that the same thing had struck him. He also told us that the medical inspector of health for schools in this area had informed him that the teeth of the children at his school were probably the weakest he had seen in the area. Significantly enough, this is one of the areas in which livestock degeneration is marked."

One farmer, they went on, who farms along progressive lines and cares for his soil, and whose animals show normal development and size, remarked that when his children came home from boarding school for vacations they were invariably pale and comparatively listless. Within a short time after their return, however, they picked up in colour, energy and general vitality. This farmer attributed the improvement to the fact that the food they received at home was good and that his vegetables were grown on compost-treated soils.

Neglected Soil

Farmers in general, they went on, particularly those who went in for livestock, had failed to appreciate the importance of soil. Too long the farmer had left the soil neglected. The livestock producer allowed his animals to graze at will on land that he made no real effort to maintain, let alone improve; the crop grower was satisfied to apply fertilizer to yield a crop, and seldom worried about feeding the soil itself. Thus it is that on too many farms the grass and crops, though they grow and are eaten, lack the essential attribute of nourishment. They are merely adequate to keep body and soul together, but fail to build strong bone, sound flesh, vitality. A want of health-giving substances in the soil means a lack of them in the plants that grow in it and this shortcoming is passed on to animal life, be it human or otherwise.

"During the past quarter of a century we have seen humans, livestock, and farms in South Africa degenerating. At first the process was slow and gradual, but during the past few years it has gathered momentum and in some districts is now very rapid. Some so-called farms, in fact, are no longer worthy of the name of farm. For them there is only one hope of salvation: all attempts at farming on them should stop, and conservation and restoration work should be carried out. Even then it will take years before they can again become productive assets, instead of the lia-

bilities they are to-day to their owners and the country as a whole.

"Farming Does Not Pay"

"Such farms are the most patent causes of the complaint one so often hears, namely, that farming does not pay. This complex grows from the fact that the farmer battles with might and main to grow crops or meat, meets with the utmost difficulty in producing anything, and then finds that his product is so poor that it cannot return a decent price. In the production period, however, it has consumed much of the farmer's time, energy and money.

"In contrast with this is the case of the farmer who can really be called progressive. He earns his living all right. His family, his livestock and his crops are all healthy, full of vitality and cheerfulness. Study his farming system and you will find that it is built on one foundation—good soil. He feeds his soil. The soil in its turn feeds everything else on the farm and what he markets, commands a reasonable price. We do not claim to be authorities on soil, but, from what we have observed on the properties of successful farmers, we have come to the conclusion that every farmer should take to heart the advice of those who preach the gospel of humus for the soil.

Real Capital

"The soil must be regarded and treated as capital. To let one's capital dwindle is fatal: it is the surest way to bankruptcy. And that applies as much to the soil as to money. It is in this respect that so many of our South African farmers have failed. We have not yet shaken off the idea of nomadic farming; our minds and our methods have not yet been adequately attuned to the change that has come about in our country. The time when a farmer could trek with his livestock from poor, worked-out veld, to rich pasture on virgin soil has gone.

"Here we should like to say that the old conception of what is virgin soil might well be abandoned. Soil on which the grass has been often grazed without proper management is no more virgin than a piece of land which has been ploughed up time after time.

"Too much emphasis has in the past been laid on getting everything one can out of the farm. In this connection, even officials of the Department of Agriculture have erred by not sufficiently inculcating the doctrine that soil, even more than money, is the true farm capital. The soil has been regarded as the preserve of the agronomist and the horticulturist. Animal husbandry officers, sheep and wool officers and so on, in preaching more and better livestock and livestock products, have barely given recognition to the source of all—the soil. Fortunately that outlook has changed considerably, but in the meantime vast damage has been done to our land and the old idea still remains rooted in the thoughts and practices of many farmers.

Wool and Erosion

"Let us look at sheep farming for a moment. Not so many years ago our Merino men had drummed into them the importance of quality, length and weight of wool, and were duly instructed in matters such as breed and feeding to improve the production per head of the sheep population—but mention of the soil was forgotten. To-day we see tracts of land that used to be prosperous sheep farms now denuded of vegetation, save perhaps for the pest of steekgras. They are cut deep by erosion, and the valuable top-soil that fed the veld grasses and shrubs in the old days is gone. Where? With the wool and carcasses of the sheep that used to run on the farms, and with the water that was able to sweep the soil away because it had not been protected and kept in good heart. If all livestock were removed from some of these farms, it would take ten years or more to remove the effects of erosion."

Asked how they would set about righting the state of affairs they had described, the two animal husbandry men said that unless the attitude of the average South African farmer towards his farm was drastically changed, the degeneration to which they had referred would convert the people of South Africa into a race inferior both in physique and in mentality to the present generation. The future of the nation lay in the hands of the farmer.

The farmer would have to abandon the old idea of getting rich quickly through exploiting large farms. To save the farms, it would be desirable to cut them up into smaller units. The owners should live in close relationship with the soil like the farmers of Britain, France, Holland, the United States and other highly developed countries. At present too much reliance was placed on the Native worker. For the salvation of his farm, the farmer himself should look after his soil. He should be as conscientious in seeing that it is properly fed and conserved as he is in supervising the feeding of his cattle, sheep and poultry

and their treatment against disease.

Land Tax

To ensure that people will not have in their possession more land than they can properly manage, they suggest that a land tax should be introduced. According to the type of farming for which an area is suited a certain morgenage should be free of tax. For instance, it might be found that a suitable size to allow a reasonable living to a farmer in certain areas was 600 morgen. In such an area any farmer possessing more than 600 morgen should be required to pay a land tax on the excess. Provision would have to be made for the taxation of those owning farms in more than one area. A land tax, it is contended, would not only help to keep the sizes of farms down to workable morgenages; it would also put an end to the practice of buying land to evade income-tax liability and, more important, would provide the necessary incentive to farmers in general to work their farms scientifically and keep the soil in good condition. And the farmer, instead of trying, as some do, to accumulate riches in the form of money over two or three years, would be rich in his soil and would have a worth-while asset to hand over to his successor.

Arsenic And Lead — Arch Enemies of Health

BY DR. WALTER SIEGMEISTER

Reprinted from Diet and Health

VEGETABLES and fruits are today extolled as the most healthful of foods. The public is encouraged to partake liberally of these health foods. Such propaganda would be in place if vegetables and fruits were obtained as nature produced them—but those we consume today have been chemically fertilized, arsenic-sprayed, and green-picked, often artificially ripened with ethylene gas. Such foods are not nature's products, but products of modern agricultural chemistry. Instead of being healthful, such chemically fertilized, sprayed vegetables and fruits may cause the worst of human diseases—CANCER.

Through knowledge of which vegetables are heavily sprayed and which are not, it is possible to intelligently select those foods which are freest from arsenic and lead, and avoid those which contain the most. In general, the cabbage family tends to be heavily sprayed, for, as is well known, these vegetables tend to be infested with insect pests. Brocolli, especially, will be full of insects if not sprayed carefully, and so will Brussel sprouts. Cabbages of all kinds are sprayed, and if eaten at all, the outer leaves should be discarded. Cauliflower should be avoided at all costs. Who has not experienced a stomach-ache produced by arsenic poisoning after eating cauliflower? Many people have experienced intestinal cramps after eating sprayed apples—the result of a mild arsenic poisoning. A few years ago, a college girl in the United States died after eating apples. Two women in New York City recently died after eating grapes.

The roots are generally safe and not sprayed as are overground vegetables. The Irish potato is an exception, as it is a tuber, not a root, and develops from materials sent down from the leaves. Hence, any poisons applied to the leaves of the potato plant are transmitted to the tubers. Insecticide poison dusted on potato tops in the evening were found in the tubers the next morning. The Idaho potato tends to be more heavily sprayed than others—and this is often indicated by a slight disagreeable taste of the potato. A physician recently noted symptoms of arsenic poisoning in a woman who ate Idaho potatoes almost exclusively for some time. She was ordered to abstain from them, and the poisoning subsided.

Fruits are usually heavily sprayed, especially apples, pears, peaches, and grapes, etc. Citrus fruits are also sprayed. Most fruit juices on the market are made from sprayed fruits and contain arsenic and lead. The safest fruits are the pineapple, coconut and banana, all of which are not sprayed, as they are not attacked by insects.

There is only one solution to this problem and that is for people to raise their own foods. We need a new "back to the soil" movement, applying new methods of Natural Soil Culture to produce insect-free vegetables, if we are to escape slow poisoning with insecticides. This situation arose because of the modern commercial production of foods for big city populations, necessitating the chemical exploitation of the soil, leading to insect pests and the necessity for spraying.

Reader's Correspondence

COMPOST PIT

Gentlemen:

I read with interest the circular you mailed to Mrs. ——— on Organic Gardening. It brought back to me thoughts of my boyhood, when my father, a physician and surgeon, had as his hobby horticulture and flora culture, and was most successful in all kinds of flowers, vegetables and fruits on our 5 acre suburban home. Father had a pit, bricked up on sides and bottom, and covered with a shed. In that pit all refuse from the garden (except obnoxious weeds) placed in the pit, and he also had a certain amount of hard wood ashes from the kitchen range put in the pit to give it natural vegetable potash. This mixture was wet down of fresh lime scattered on top to prevent smell and insect infestation. I imagine the Howard system was something like my father's method, used over 50 years ago.

Rivers F. Ross,
Selma, Ala.

●

POTATOES

All summer, while others are sweating over their gardens, I am enjoying the scenery of my garden as a hobby. Compost, yes, and only partly composted compost, is used as a mulch, to illustrate:

Scarified soil, after removal of winter rye by sicle and five pronged hand hoe, then pressed large cut of potato into it with the flat of my hand. Then, covered same with two inches of composting pile, awaited potatoes to show through, then added a total of about 6 inches of composting compost.

Before last weeks wind storm they stood up to my waist line (I am 6 ft.). Planted last week in April, I pulled a stalk this week, couldn't resist peeking, and found four potatoes larger than a silver dollar — and 14 small ones, coming along.

No potato bugs, only, early, the black beetle eat a few small holes. Stalks are still green as can be. The patch looks like a young forest — no weeds.

Beans are wonderful, planted same method, no sign of Mexican beetle as yet. Cucumbers look bug resistant. Onions from seed are way ahead of last year, this time. Tomato stalks, up about 30 inches on stalk measure close to ¾ inch in diameter — and so green and sturdy.

You've got something and I am using it, experimenting further with compost as a mulch which will never give my soil indigestion.

Keep the good work rolling and it will profit a Nation.

A. W. Rossiter,
Phoenixville, Pa.

▦

TREE STUMPS

Mr. J. I. Rodale:

Mr. Delassalle, a friend of mine, told me that his place in Long Island is what was formerly part of a forest. The trees were removed by cutting or burning. His son took out several stumps by digging but found this too hard work. Delessalle is letting termites remove the rest of the stumps for him. He covers the stumps with earth, *using no NPK or arsenate-of-lead or poison sprays,* so as to encourage the termites as other O. G. fans encourage the earthworms. His house is high off the ground on

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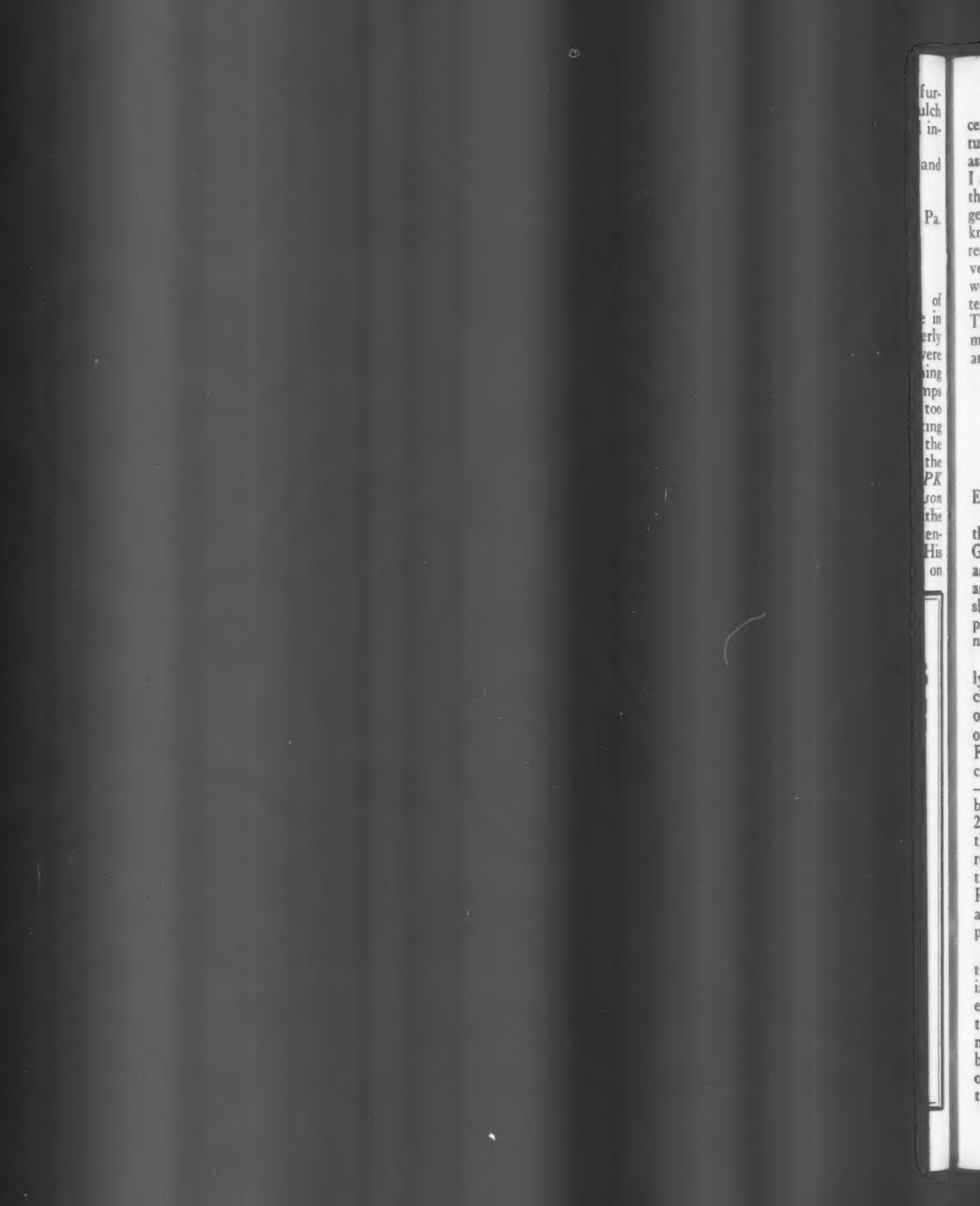

cement, and termites at this latitude do not eat people's houses as voraciously as in the South. I asked him whether he was sure that it is termites which are digesting the stumps. He says he knows them well. They leave a residue after digesting the stumps very much like that of the earthworms, which eat organic matter but find wood rather too hard. This termite residue, as he finds, makes the ground very fertile around the stump.

H. C. Haas,
N. Y. City.

SEWAGE

Editor of Organic Gardening:

I have noticed in several of the last issues of the Organic Gardening several questions were asked: Will vegetables grow in ashes; can human excreta or sludge from sewage disposal plants be used for fertilizer; do not poison sprays kill birds?

About 30 years ago the Brooklyn Ash Removal Co. either purchased or leased about 500 acres of salt meadow on the south side of the Flushing River, near Flushing, Long Island, N. Y. and carried all refuse — not garbage — from the City of Brooklyn, by barge or train, and for about 25 years dumped this stuff on the meadows. When the piles reached the grade established by the City of New York, the Ash Removal Co. removed all cans and such and levelled the whole place off.

Corona, which is just south of this dump, contained many Italians, who asked the superintendent of the dump for permission to plant gardens on this fill. Permission was given to them. They built fences of old roofs, tin cans, old bedstead, etc. and raised the finest vegetables I have ever seen. Everything that grew above the ground—not root vegetables.

This continued for a few years, and then the whole plot and about 500 acres more were acquired by the City of New York for the World's Fair of 1939. It is now a public park conducted by the City.

As this old fill was full of street sweepings, ashes and other refuse from the city streets, it was, no doubt, fine for plants. Many years ago I developed a piece of property in the easterly end of Queens Borough. One street was about two feet below the grade established by New York, for about 200 feet in length. I applied to the Department of Sanitation for ashes — not garbage — for the fill. After cleaning out the cans, old boilers, etc., I levelled the whole street off and left it for about a year. That was in the fall. The following summer I inspected the place for the first time after the filling. I was surprised to see flowers, tomato plants, corn and many tall weeds growing on this fill. No bugs, no blight and all in fine condition. Of course, this was not all ashes, but everything.

About 40 years ago when Astoria, Long Island, N. Y. was only a rural community and had neither sewers or cesspools and privies only were used, the section near the present Northern Blvd. and old Broadway was open country and farms. One farm in this section was conducted by Chinese, who worked in large straw hats and bare feet, just as they have done in China for centuries. These Chinese used the contents of the local privies for fertilizer and had wonderful gardens. However, I did notice that they did not use the contents of cesspools. They told me that it was no good: it

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THOS. J. BARRETT,
Earthmaster Farms, Box C-10,
Roscoe, Calif.

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We have just received a carload of raw finely-ground phosphate rock, but can use only half on our farm this year. Have 20 tons to dispose of.
ORGANIC GARDENING,
Emmaus, Penna.

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Emmaus. Pa.
Gentlemen:
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contained too much soap from washing.

Far Rockaway, New York, has, or had a sewage disposal plant for treating the sewage of that section. The residue from this plant was like a black soft mud. It was placed on the salt meadows of Jamaico Bay where it lay for years. It didn't seem to rot or disappear.

I asked one of the employees why they didn't give it or sell it to the farmers for fertilizer. They said the farmers had tried it, but it wouldn't work. It contained too much alkalie.

A neighbor of mine here in Woodbury, Conn. raises about 30,000 to 40,000 bushels of potatoes every year on the same plot. This year he ploughed up a plot of 40 acres that had been meadow for many years. After he planted the crop he noticed many birds in that particular section. After the plants were about a foot high he started to spray and noticed that there were many of the friendly ladybugs on the plants. In a few days he visited the plot and found the ladybugs and the birds all dead. I, too, have noticed the absence of birds in this section this year. His new plot is only about a quarter of a mile from my place, and, no doubt the spraying of that particular field has poisoned them all.

E. G. Manning,
Woodbury, Conn.

EDITOR'S NOTE — The mere appearance and size of plants is not a sufficient test. We want food that has the optimum nourishing qualities and is full of vitamins. Hard coal ashes contain strong sulphites that are detrimental to the biologic life of the soil. Soft coal is even worse. In preparing our vegetable garden this spring our foremost aim was quality of the plants. We wouldn't dream of putting any ashes in. The good effect that ashes give to a heavy soil, namely aeration, can be obtained by using peat moss, humus and even sand.

FLOWERS

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Organic Gardening — Emmaus, Pennsylvania

olus, chrysanthemums and all other flowers? My plants are getting all eaten up in spite of spraying. This year is the worst we have had for pests.

J. L.,
Los Angeles.

Answer

We know you will have splendid results with flowers using the organic method. Compost may be safely applied even to acid-loving flowers such as the rhododendron.

DRIED BLOOD

How would dried blood, obtainable from a local slaughter house, rank as an organic fertilizer for fruit trees and garden use? Would it be advisable to incorporate dried blood in the making of a compost heap?

Edwin F. Boehme,
Cincinnati, Ohio.

Answer

Dear Mr. Boehme:

Dried blood is one of the richest in nitrogen of the organic nitrogenous materials. Also it seems to decay very rapidly in the soil during warm weather. It is advised that it should be composted before use. It contains anywhere from 9 to 14% nitrogen, depending on how it is made, and has only slight traces of phosphoric acid. If used alone for general garden use, it would be rather lopsided. For fruit trees it would be especially so, because it is a known fact that for orchard use nitrogen is the least important item. There should be twice as much phosphorous as nitrogen, and also, perhaps, twice as much potash.

Therefore, in order to make use of this dried blood that is available to you, it would be best to work out a mixture of organic materials that would give you all the elements needed. We are talking now in the case where you cannot make regular compost, but want to use a special organic type of fertilizer from purchased materials.

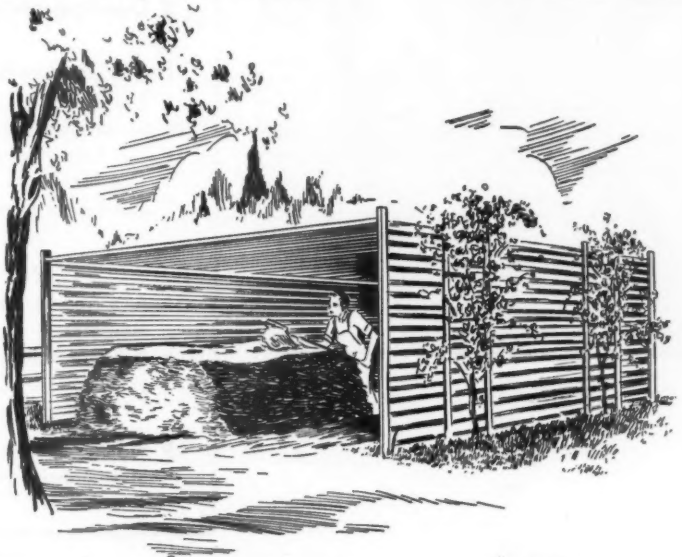
In addition to the dried blood, therefore, you would have to add such things as wood ashes for potash, and bone meal for phosphorous. This is somewhat of a new idea, and we are going to study into this matter further. We hope that in a few months we can publish a few formulae showing how a 100% organic mixture can be made from purchased material.

For regular use in your compost heaps dried blood would be excellent. Use it with the manure. If you have no manure, use it with bone meal as a manure substitute.

ROOFED COMPOST YARD

Dear Mr. Rodale:

The only place I have for a compost pile is in the chicken lot. What do you think of building a slat enclosed form large enough to hold 2 piles for turning. I could put some kind of top on to regulate the amount of moisture from rain fall.



I am more convinced than ever that the organic way is *the* way. Last year I raised canteloupes and watermelons for the first time. You never saw healthier plants and foliage all summer and nary a time did I dust them or pick any beetles off, and before, they always died for me before fruit matured. I used compost last year.

Joseph W. Wiley,
Anderson, Idiana.

Answer

Dear Mr. Wiley:

Your idea of building a slat enclosed form for a compost heap is practical. If you would put slats at the top, spaced so that it would protect the heap from the sun, but allow the rain to come in, it would work out excellently. Of course it would be expensive.